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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,877	05/12/2005	Armin Schwerdtner	013150-012	6555

20802 7590 05/06/2008  
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EXAMINER
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CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

MAIL DATE	DELIVERY MODE
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05/06/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/534,877	<b>Applicant(s)</b> SCHWERDTNER, ARMIN	
	<b>Examiner</b> Audrey Y. Chang	<b>Art Unit</b> 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 11-16, 18-48 and 50-64 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-16, 18-48 and 50-64 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 April 2007 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **January 16, 2008** has been entered.
2. This Office Action is also in response to applicant's amendment filed on **February 27, 2008**, which has been entered into the file.
3. By this amendment, the applicant has amended claims 11-14, 16, 18-22, 32-34, 41, has canceled claims 17 and 49, and has newly added claims 51-64.
4. Claims 11-16, 18-48 and 50-64 remain pending in this application.

### ***Specification***

5. The amendment filed April 30, 2007 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the newly added paragraphs concerning the newly added figures are not fully support by the original disclosure of the specification. The amendment to the specification therefore has not been entered.

Applicant is required to cancel the new matter in the reply to this Office Action.

### ***Drawings***

6. The drawings were received on April 30, 2007. These drawings are **NOT ACCEPTED**.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. **Claims 11-16, 18-48 and 50-64 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

**Claims 1 and 41 have been amended** to include the phrase "optical system generating a Fourier or inverse Fourier transform of the hologram encoded on the hologram-bearing medium at the image plane of the light source". It is not clear how could the optical system is capable of generating "Fourier transform" of the hologram. Does this mean the hologram is a Fourier transform hologram or not? If the hologram is a Fourier transform hologram, then the Fourier transformation is not generated by the optical system rather is the hologram itself being encoded as Fourier transform hologram. Judging from the Figures of the instant application, it appears this optical system is functioned to provide collimating light beam to illuminate the hologram. It is really not "generating Fourier transform of the hologram". Further, Fourier transform and inverse Fourier transform are inverse function to each other. While the optical system is demonstrated to inverse Fourier transform the light from the light source to provide collimating beam for illuminating the hologram the specification fails to teach how does the optical system to provide Fourier transform to the light from the light source. The claims therefore are not enabling.

The specification fails to provide the enablement of Fresnel transformation of the hologram and not the Fourier transformation of the hologram as recited in the claim 16 in particular claim 11, its based claim, has been amended to explicitly stated the optical system is to generate Fourier transform of the

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hologram. This seems to be contradicting to each other. Even if Fresnel transformation is a general case of Fourier transformation, Fresnel transformation CANNOT be ruled as "not Fourier transformation".

The specification fails to disclose how does the virtual light source is generated. **(The applicant is respectfully noted that the proposed amendment to the specification and proposed new drawings filed on April 30, 2007 have NOT been entered. So the arguments based on these non-entered amendments to the application are not persuasive to overcome the rejections.)**

The specification fails to disclose how the light source is being positioned by the mechanical or electronic displacement or by movable mirrors.

#### ***Claim Objections***

9. **Claim 50 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.** Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

The feature concerning "hologram bearing medium" has already been claimed in the based claim – claim 41.

10. **Claims 1-16, 18-48, and 50-64 are objected to because of the following informalities:**

(1). It is not clear how could the optical system to either generating Fourier or inverse Fourier transformation to the hologram. Since they are inverse to each other, so it is not clear which one is really referred here?

(2). Claim 16 is contradicting to amended based claim, claim 11. The amended claim 11 recites explicitly to have optical system to generate Fourier transform of the hologram but claim 16 recites "not Fourier transform of the hologram" that is contradicting to each other.

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(3). It is not clear what is considered to be the "function of the periodicity interval of the hologram"? as recited in claim 18.

(4). The phrase "the viewing window is smaller than the hologram bearing medium" (noted the amendment to claim 19 is not proper, which lacking the proper deletion and underlined for the alteration), recited in claim 19 is confusing since it is not clear how does the viewing window comparing to the bearing medium?

(5). The phrase "and/or" recited in claim 35 is confusing and indefinite.

(6). It is not clear how does the "hologram-bearing medium controls phase, amplitude or phase and amplitude". Firstly, the phase and amplitude of what? Secondly how does the hologram medium control it? Does this mean the hologram encoded on the medium controls the phase and amplitude or the medium by itself controls the phase and amplitude?

**Appropriate correction is required.**

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**12. Claims 11-16, 18-48, 50 and 51-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over the US Patent Application Publication (US 2004/0263930 A1) by Payne.**

**Payne** teaches a method and an apparatus for illuminating a *computer generated hologram* wherein a *computer* that serves as the *computational unit* is used to compute the computer generated hologram. **Payne** teaches that the computer generated hologram is displayed on a *spatial light modulator* (1, Figure 1), that serves as the *hologram-bearing medium*, this implies that the computer or the

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computational unit is used to *control and encode the hologram on the spatial light modulator or hologram-bearing medium.*, and a method step for controlling the spatial light modulator for displaying the hologram is included. Payne teaches that a *light source* (2) and an *optical system* (3) are used to illuminate the hologram (3), wherein the optical system (3) is placed at a distance equals to focal length of the optical system from the light source to provide a collimating light beam to illuminate the hologram bearing medium to reproduce the hologram. This arrangement will provide **inverse Fourier transform** to the reproduced hologram the *same way* as the instant application. A wavefront will certainly be generated from the illumination of the hologram and implicitly that an observer can view the reconstruction of the hologram through a *viewing window* at the image plane of the light source through the optical system. Payne further teaches that the hologram can further be Fourier transformed by reply optics (4 and 5, Figure 1, please see paragraph [0009]).

This reference has met all the limitations of the claims. A spatial light modulator implicitly has matrix of pixels or cells. This reference however does not teach *explicitly* to have the viewing window not larger than a single diffraction order. However this feature is either inherently met or an obvious modification to one skilled in the art, different diffraction orders of diffracted light are commonly spatially separated and to have the viewing window not larger than the single diffraction order would reduce the cross talks between different diffraction orders of light.

With regard to claims 12 and 51-52, it is implicitly true that the viewing window is positioned in relating to the eye of the observer, since hologram is direction selective, placing eye outside the viewing direction determined by the encoded hologram will not be able to view the reconstructed hologram.

With regard to claims 13-14, it is implicitly true that the holographic reconstruction is made up of multiple secrete points and each of the point is related to the region of the spatial light modulator encoded with information for reconstructing that point.

With regard to claim 16, Payne teaches that the light source and the optical system (3, Figure) is arranged to provided inverse Fourier transformation for the light source. The light from the light source via optical system to illuminate the hologram will produce hologram at the inverse Fourier transform plane of the light source. The reproduced hologram is then Fourier transformed by the reply optics, at the image plane of the light source, (please see paragraph [0009]). However this reference does not disclose explicitly that optical system generating a Fourier or inverse Fourier transform of the hologram at the image plane of the light source, will be Fresnel transform of the hologram not the Fourier transform of the hologram. However this feature is completely confusing and wrong so it cannot be examined further.

With regard to claims 22, 31, 42 and 453, this reference does not teach to tracking the eye of an observer, however eye tracking sensor is well known in the art for detecting the eye position of an observer for allowing the light illumination and therefore the display of an image be accommodate with the movement of the observer.

With regard to claims 26-29 and 54-59, Payne teaches that the light source may include individual real point light source, line light source, a plurality of point light sources, (please see Figures 1-6). However this reference does not teach explicitly that the light source is virtual light source. But since the specification fails to disclose the criticality of the light source being virtual as compared to being real light source, such modification is considered to be obvious matters of design choice to one skilled in the art for the benefit of using available light source as desired.

With regard to claims 30 and 60, this reference does not teach explicitly of positioning the light sources by the claimed means. However it is known in the art that a light source can be positioned by mechanical means as needed.

With regard to claims 35-40, 43-45, 61-64, Payne teaches that the spatial light modulator is used to display the computer generated hologram this means the spatial light modulator can control the phase and the amplitude. This reference does not teach explicitly of reproducing color hologram. However a



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standard spatial light modulator can display color image with three primary color sub-pixels as one single pixel. It would have been obvious to one skilled in the art to make the display a color holographic display. This reference also does not teach that the spatial light modulator is a TFT flat screen. But since TFT flat screen is one known type of spatial light modulator such modification would have been obvious to one skilled in the art to use commercial available modulator for the display.

With regard to the features of intended uses of the display as gaming device, medical image display device or military information display device, such modifications are considered obvious to one skilled in the art for the benefit of achieving the desired the application functions.

With regard to claim 50, the hologram bearing medium or the spatial light modulator is included in the disclosure of Payne.

### ***Double Patenting***

13. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

14. **Claims 11-16, 18-48 and 50-64** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. **11/427,629**. Although the conflicting claims are not identical, they are not patentably distinct from each

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other because they both claim reconstructing three-dimensional scene using light source and hologram encoded in hologram bearing medium with the hologram be Fourier transformed.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

15. **Claims 11-16, 18-48 and 50-64 are provisionally rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-21 of **copending Application No. 11/313,989**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claimed hologram that is reconstructed. In various dependent claims they both claimed the same method for encoding into a region of the hologram information solely for a single point of the three dimensional scene.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

16. **Claims 11-16, 18-48 and 50-64 are provisionally rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of **copending Application No. 11/427,638**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim a display device and method for reconstructing hologram. The identical specifics concerning the hologram are explicitly stated in the various dependent claims of both applications.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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17. **Claims 11-16, 18-48 and 50-64 are rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of **U.S. Patent No. 7,315,408**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim display device for reconstructing hologram. The identical specifics concerning the hologram are explicitly stated in the various dependent claims of both applications.

18. **Claims 11-16, 18-48 and 50-64 are provisionally rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of **copending Application No. 11/427,645**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim hologram that can be reconstructed to generate three dimensional object scene. The identical specifics are claimed in the various dependent claims of both applications. .

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

19. **Claims 11-16, 18-48 and 50-64 are provisionally rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-23 of copending Application No. **11/427,649**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they claim display device for hologram reconstruction. The identical specifics of the hologram are claimed in both applications.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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20. **Claims 11-16, 18-48 and 50-64 are provisionally** rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-23 of **copending Application No. 11/427,655**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim hologram that is reconstructed. The identical specifics concerning the hologram are claimed in dependent claims of both applications.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

21. **Claims 11-16, 18-48 and 50-64 are provisionally** rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. **11/937,991**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim display device for reproducing hologram. .

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

#### ***Response to Arguments***

22. Applicant's arguments filed on January 16, 2008 have been fully considered but they are not persuasive. The newly amended and newly added claims have been fully considered and they are rejected for the reasons stated above.

23. In response to applicant's arguments which state " Payne does not disclose "the optical system generating a Fourier or inverse Fourier transform reconstruction of the hologram encoded on the hologram-bearing medium at the image plane of the light source...". Instead, in Payne, it is the holographic reconstruction representing the three-dimensional scene that is **at the image plane of the light source**, and not just the Fourier transform of the hologram. See Payne: "A 3D image 6 appears to the viewer to be located in the image/Fourier plane of the replay optics" [0009]. So Claim 11 requires a

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step that Payne explicitly teaches away from.”, (please see remark filed on January 16, 2008 page 1). The examiner respectfully disagrees, since Payne teaches explicitly the hologram is Fourier transformed by the reply optics, (please see same paragraph [0009]).

24. In response to applicant's arguments which states that the cited Payne reference does not teach to provide viewing window in the image plane of the light source” the examiner respectfully disagrees. Firstly, the 3D image reproduced is at the image plane of the light source as applicant indicates above in paragraph [0009] of Payne. So 3D image is viewed at the image plane of the light source. Secondly, since the hologram is direction selective, which means reproduced hologram can only be viewed at the direction determined by the recording beams of the hologram, certain viewing region or window is implicitly determined by the hologram.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

***Audrey Y. Chang, Ph.D.***  
***Primary Examiner***  
***Art Unit 2872***

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